

## Title

### **Portable Reading Light for Vehicle**

## Background of the Present Invention

### **Field of Invention**

5           The present invention relates to a light apparent, and more particularly to a portable reading light for a vehicle, which comprises a fastening device that allows the user to quickly and easily attach the reading light at the interior of the vehicle for illuminating purpose.

### **Description of Related Arts**

10           A portable light, such as a torch or a flashlight, is considered as one of the common outdoor illuminating tools for a user to map reading at dark. Imaging that when a passenger wants to map reading in a vehicle during nighttime, he or she must turn on the overhead light or the dome light. However, it is dangerous for the driver since the light will distract the driver during driving when the overhead light is switched on. In  
15           addition, the light intensity of the overhead light is insufficient to light up the cabinet of the vehicle such that some passenger, such as senior, cannot clearly read the map.

          Therefore, the passenger requires the portable light to provide a closer lighting distance to the map for reading. The passenger may merely carry the portable light when he or she needs to read in the vehicle since the portable light provides sufficient light  
20           directly projecting on the map. In addition, the position of the portable light must be adjusted by the movement of the passenger's hand. However, it is a hassle for the passenger to hold the portable light at one hand while the book or map at the other hand. In other words, such portable light cannot provide hand free properties for the user in the vehicle.

25           In addition, it is inconvenient that the user must hold the flashlight at one hand while camping. Therefore, an improved portable light further comprises a clipping arm

extended from the light source to clip on the user's body. The most common attachment of such portable light is that the clipping arm is clipped on a lid of the user's cap or on a headband. However, the weight of the light source will drop downwardly since the light source is extended from the user's head through the clipping arm. Therefore, the structural design of such improved portable light will create an unstable momentum especially during the head movement of the user. In other words, the portable light cannot provide a secure attachment to fasten on the user's body.

Moreover, the clipping arm is pivotally connected to the light source to selectively adjust the projecting angle thereof. However, the user must unfasten the portable light from his or her body to adjust the projecting angle of the light source. It is a hassle for the user to unfasten and fasten the portable light for only adjusting the projecting angle thereof.

### Summary of the Present Invention

A main object of the present invention is to provide a portable reading light for a vehicle, which comprises a fastening device that allows the user to quickly and easily attach the reading light at the interior of the vehicle for illuminating purpose.

Another object of the present invention is to provide a portable reading light for a vehicle, wherein the fastening device is a multi-functional clip adapted for securely supporting within the interior of the vehicle such as vehicle seat belt or vehicle door, or on a user's body such as the headband, the user's cloth, or even the neck loop, so as to broaden the use of the present invention.

Another object of the present invention is to provide a portable reading light, which provides a hand free ability that the user is able to selectively locate the portable reading light to adjust the lighting distance without holding the portable reading light by hand.

Another object of the present invention is to provide a portable reading light, which comprises a light base for receiving a replaceable battery and a light housing foldably extended from the light base via a pivot arm so that the portable reading light of

the present invention is constructed to have a compact size to enhance the portability thereof.

Another object of the present invention is to provide a portable reading light, wherein the fastening device is provided at the light base to fasten on the user's body so  
5 that the center of mass of the portable reading light is shifted close to the user's body so as to enhance the stabilization of the portable reading light when the portable reading light is fastened on the user's body.

Another object of the present invention is to provide a portable reading light, wherein the user is able to selectively adjust the projecting angle of the illumination unit  
10 by simply folding the pivot arm with respect to the light base without unfastening the light base from the user's body.

Another object of the present invention is to provide a portable reading light, wherein the operation of the illumination unit is constructed to incorporate with the folding movement of the light housing. In other words, when the light housing is folded  
15 into its folded position, the illumination unit is automatically switched off. Once the light housing is folded into its unfolded position, the illumination unit is automatically switched on.

Accordingly, in order to accomplish the above objects, the present invention provides a portable reading light for mounting on a user's body, comprising:

20 an illumination unit;

a light body, comprising:

a light base having a battery compartment for receiving a replaceable battery therein to electrically connect to the illumination unit;

a light housing, having a transparent window, wherein the illumination unit is  
25 received in the light housing and is capable of producing light to outside through the transparent window; and

a pivot arm having a coupling end extended from the light housing and a pivot end pivotally connected to the light base in such a manner that the light housing is adapted to pivotally fold between a folded position and an unfolded position, wherein at the folded position, the pivot arm is pivotally folded towards the light base that the light housing is overlapped with the light base to form a compact structure, and at the unfolded position, the pivot arm is pivotally folded with respect to the light base that the light housing is outwardly extended from the light base to provide a projecting angle; and

a fastening device provided at a rear side of the light base for detachably fastening the light body on the user's body.

These and other objectives, features, and advantages of the present invention will become apparent from the following detailed description, the accompanying drawings, and the appended claims.

### Brief Description of the Drawings

Fig. 1 is a perspective view of a portable reading light according to a first preferred embodiment of the present invention.

Fig. 2 is an exploded perspective view of the portable reading light according to the above first preferred embodiment of the present invention.

Fig. 3 is a perspective view of the portable reading light at a folded position according to the above first preferred embodiment of the present invention.

Figs. 4A through 4E illustrate the use of the fastening device of the portable reading light according to the above first preferred embodiment of the present invention.

Fig. 5 illustrates an alternative mode of the pivot arm of the portable reading light according to the above first preferred embodiment of the present invention.

Fig. 6 is a perspective view of a portable reading light according to a second preferred embodiment of the present invention.

## Detailed Description of the Preferred Embodiment

Referring to Figs. 1 through 3 of the drawings, a portable reading light for mounting at an interior of the vehicle or on a user's body according to a preferred embodiment of the present invention is illustrated, wherein the portable light comprises an illumination unit 10, a light body 20 and a fastening device 30.

The light body 20 comprises a light base 21 having a battery compartment 211 for receiving a replaceable battery therein, a light housing 22, having a transparent window 221 to receive the illumination unit 10 therein, and a pivot arm 23 having a coupling end 231 extended from the light housing 22 and a pivot end 232 pivotally connected to the light base 21 wherein the light housing 22 is adapted to pivotally fold between a folded position and an unfolded position. In which, at the folded position, the pivot arm 23 is pivotally folded towards the light base 21 that the light housing 22 is overlapped with the light base 21 to form a compact structure, and at the unfolded position, the pivot arm 23 is pivotally folded with respect to the light base 21 that the light housing 22 is outwardly extended from the light base 21 to provide a projecting angle.

The fastening device 30 provided at a rear side of the light base 21 for detachably fastening the light body 20 at the interior of the vehicle or on the user's body.

According to the preferred embodiment, the illumination unit 10 comprises a circuit 11 electrically connected to the replaceable battery within the battery compartment 211 of the light base 21 via an electric cable 111, and at least an illuminator 12 electrically mounted on the circuit 11 to produce the light to outside through the transparent window 221 of the light housing 22. Accordingly, the illuminator 12 can be any illuminator, such as LED, adapted for producing the light.

The pivot arm 23, which is constructed as a hollow elongated member, further has an interior cavity 230 provided between the coupling end 231 of the pivot arm 23 and the pivot end 232 thereof, wherein the electric cable 111 is extended from the battery compartment 211 of the light base 21 to the light housing 22 through the interior cavity 230 for electrically connecting the illumination unit 10 with the replaceable battery.

As shown in Figs. 1 and 3, the coupling end 231 of the pivot arm 23 is securely attached to a sidewall of the light housing 22 and the pivot end 232 of the pivot arm 23 is rotatably mounted to a sidewall of the light base 21 in such a manner that the pivot arm 23 is pivotally folded to its folded position that the pivot arm 23 is overlapped with the sidewall of the light base 21 while the light housing 22 is folded to overlap on a bottom side of the light base 21. As shown in Fig. 3, when the light housing 22 is folded up with the light base 21, the light body 20 is constructed to have a compact box shape so as to enhance the portability of the portable reading light of the present invention.

The portable reading light further comprises a switch control 40 which comprises a switch button 41 provided on the light housing 22 to electrically connect to the illumination unit 10 and a switching arm 42 which is outwardly and integrally extended from the light base 21 and is arranged in such a manner that when the light housing 22 is folded into the folded position, the switching arm 42 is driven to depress the switch button 41 so as to switch off the illumination unit 10. In other words, when the light housing 21 is folded into its folded position, the illumination unit 10 is automatically switched off. Once the light housing 21 is folded into its unfolded position, the illumination unit 10 is automatically switched on. Therefore, the folding operation of the light housing 22 is incorporating with the switching operation of the illumination unit 10, such that the user is able to fold and switch off the portable reading light of the present invention in one single action.

Accordingly, the switch control 40 further has a receiving indentation 43 formed on the light housing 22 at a position where the switch button 41 is provided thereon wherein when the switching arm 42 is driven to depress on the switch button 41 to switch off the illumination unit 10, the switching arm 42 is fittingly received within the receiving indentation 43, so as to ensure the switch off position of the illumination unit 10. It is worth to mention that the switch arm 42 functions as a stopper to stop the folding operation of the light housing 22 with respect to the light base 21 so as to ensure the light housing 21 folding at its folded position when the switch arm 42 is received on the receiving indentation 43.

The switch control 40 further comprises a light control button 44 provided on the light housing 22 to electrically connect with the illumination unit 10 wherein the light control button 44 is arranged to control a light effect of the illumination unit 10, such as

flashing. Therefore, the portable reading light can be an emergency flasher especially when the user needs a roadside assist or during camping.

As shown in Fig. 2, the fastening device 30 is a multi-functional fastening unit comprising a clipping member 31 having one edge attached on the rear side of the light base 21 to define a fastening cavity 310 between the clipping member 31 and the rear side of the light base 21 in such a manner that the light base 21 is capable of securely clipping on a belt by sliding the belt into the fastening cavity 310 through an opening edge of the clipping member 31.

As shown in Fig. 4A, the portable reading light of the present invention is fastened on a seat belt of a vehicle by clipping the clipping member 31 thereon, such that when the passenger fastens the seat belt on his or her body, the portable reading light can be clipped on the seat belt at a position that the portable reading light is located at the chest of the passenger. In other words, the portable reading light can be selectively fastened with the belt for outdoors use and the seat belt for vehicle use. Therefore, the portable reading light of the present invention provides a hand free ability that the user is able to selectively slide the portable reading light along the seat belt to adjust the lighting distance with respect to a reading object, such as map or book, without holding the portable reading light by hand.

Likewise, the portable reading light of the present invention is capable of clipping on a cap by clipping the clipping member 31 at an elongated strap of the cap, as shown in Fig. 4B, such that the user is able to work at dark especially during camping.

The fastening device 30 further has two T-shaped fastening slots 32 formed at two side edge portions of the clipping member 31 respectively to communicate with the fastening cavity 310 wherein the two T-shaped fastening slots 32 are arranged for slidably engaging with an elongated belt so as to fasten the light base 21 on the user's body, as shown in Fig. 4C.

The fastening device 30 further has a S-shaped fastening slot 33 formed on the clipping member 31 to communicate with the fastening cavity 310 wherein the S-shaped fastening slot 33 is arranged for the edge portion of the cloth slidably passing therethrough so as to fasten the light base 21 on the user's body, as shown in Fig. 4D. It is worth to mention that the S-shaped fastening slot 33 provides two opposed clipping

positions such that the user is able to selectively fasten the portable reading light of the present invention on the user's body via the S-shaped fastening slot 33.

5 The fastening device 30 further has two through holes 34 formed on the clipping member 31 to communicate with the fastening cavity 310 wherein the through holes 34 are arranged for an elongated cable, such as a neck loop, slidably passing through so that the portable reading light can be worn on the user's body via the elongated cable, as shown in Fig. 4E.

10 In addition, the fastening device 30 further comprises a first fastener 351 provided on the rear side of the light base 21 at the clipping member 31 and a second fastener 352 adapted for selectively providing on the interior of the vehicle, wherein the second fastener 352 is detachably fastened with the first fastener 351 for detachably mounting the light body 20 at the interior of the vehicle. As shown in Fig. 4E, the first and second fasteners 351, 352 are hook and loop fasteners, wherein the user is able to selectively attach the second fastener 352 in the vehicle at a desired location, such as the door surface or the dashboard, such that the portable reading light is adapted to store in the vehicle.

20 Accordingly, it is obvious that the fastening device 30 can be simply incorporate with a hand screw, as shown in Fig. 5, to provide a quick and easy attachment for fastening the light base 21 at the interior of the vehicle, such as the door of the vehicle. In other words, the hand screw functions as a hanger to hold the portable reading light on the door of the vehicle in position. In addition, the fastening device 30 can be embodied as an attaching means for detachably attaching the light base 21 on an interior surface of the car door such that the user, such as the passenger, is able to detach the portable reading light from the car door for convenience.

25 As it is mentioned above, the vehicle generally comprises a door light device provided at the door for illuminating purpose, wherein such door light device comprises a diffused lens to spread out the light as an indicating signal of the door such that no angle adjustment can be operated with respect to the height of the user sitting in the vehicle for reading purpose. In addition, the driver will distract by the light during driving when the door light device is switched on.

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Therefore, when the portable reading light of the present invention is provided at the door of the vehicle, the LED of the illuminator 12 inherently provides a narrow lighting angle to focus on the reading object, such as map or book, so as to minimize the driving distraction with respect to the driver when the portable reading light is switched on. In addition, the lighting angle adjustment of the portable reading light can be selectively operated through the pivot movement of the pivot arm 23 so as to enhance the focus of the light on the reading object and to reduce the lighting distance between the portable reading light and the reading object. Furthermore, the portable reading light can be built-in with the door of the vehicle, wherein the electric supply of the portable reading light can be supplied from the battery of the vehicle so as to further minimize the size of the portable reading light by reducing the battery compartment 211 thereof.

It is worth to mention that when the replaceable battery is received in the battery compartment 211 of the light base 21, the weight of the portable reading light will be substantially increased. However, when the portable reading light is fastened on the user's body, the light base 21 is positioned close to the user's body such that the center of mass of the portable reading light is shifted close to the user's body so as to enhance the stabilization of the portable reading light when the portable reading light is fastened on the user's body.

In addition, the projecting angle of the illumination unit 10 can be selectively adjusted by pivotally folding the pivot arm 23. Therefore, the user does not have to unfasten the portable reading light from the user's body in order to adjust the projecting angle of the illumination unit 10.

Fig. 5 illustrates an alternative mode of the pivot arm 23' which has a coupling end 231' rotatably connected to the light housing 22 and a pivot end 232' pivotally connected to the light base 21 in such a manner that the pivot arm 23' is pivotally folded to its folded position that the pivot arm 23' is overlapped with the sidewall of the light base 21 while the light housing 22 is folded to overlap on a bottom side of the light base 21. Therefore, the user is able to selectively adjust the projecting angle of the illumination unit 10 by pivotally folding the pivot arm 23' with respect to the light base 21 and by rotatably folding the light housing 22 with respect to the pivot arm 23'.

Furthermore, the light body 20 further comprises a magnifying lens 24 slidably mounted on a rear wall of the light housing 22 aligning with the direction of the light

emitted from the illumination unit 10 such that the senior is able to slide out the magnifying lens 24 for enhancing the reading ability.

As shown in Fig. 6, a portable reading light of a second embodiment of the present invention illustrates an alternative mode of the first embodiment of the present invention. The portable reading light, which is mainly for automotive use, comprises an illumination unit 10A, a light body 20A and a fastening device 30A.

The light body 20A comprises a light base 21A having a battery compartment 211A for receiving a replaceable battery therein, a light housing 22A, having a transparent window 221A, to receive the illumination unit 10A therein, and a pivot arm 23A having a coupling end 231A extended from the light housing 22A and a pivot end 232A pivotally connected to the light base 21A.

The fastening device 30A provided at a rear side of the light base 21A for detachably fastening the light body 20A on a seat belt fastening on the user's body.

According to the second embodiment, the pivot arm 23A is embodied as a coupling joint wherein the pivot end 232A of the pivot arm 23A is pivotally connected to the light base 21A and the coupling end 231A of the pivot arm 23A is rotatably connected to the light housing 22A in such a manner that the light housing 22A is adapted to pivotally fold to a folded position that the light housing 22A is overlapped on a front side of the light base 21A and an unfolded position that the light housing 22A is outwardly extended from the light base 21A to provide a projecting angle.

The fastening device 30A comprises a belt fastener 31A provided on the rear side of the light base 21A for slidably fastening on a seat belt in such a manner that the light base 21A is capable of securely clipping on the seat belt in a slidably movable manner. It is worth to mention that the belt fastener 31A can be embodied as the clipping member 31 to slidably mount along the seat belt wherein the first fastener 351 can be provided on the belt fastener 31A to detachably fasten with the second fastener 352 at the interior of the vehicle.

The portable reading light further comprises a switch button 41A provided on the light housing 22A to electrically connect to the illumination unit 10A and a switching arm 42A which is outwardly and integrally extended from the light base 21A and is

arranged in such a manner that when the light housing 22A is folded into the folded position, the switching arm 42A is driven to depress the switch button 41A so as to switch off the illumination unit 10A. In other words, when the light housing 21A is folded into its folded position, the illumination unit 10A is automatically switched off.

5            Since the portable reading light according to the second embodiment is used for fastening on the seat belt, the thickness of the portable reading light should be minimized. Accordingly, the illumination unit 10A comprises a circuit 11A electrically connected to the replaceable battery within the battery compartment 211A of the light base 21A, and at  
10           outside through the transparent window 221A of the light housing 22A. The circuit 11A should be embodied as a flexible circuit board having a thickness approximately 3mm wherein the illuminator 12A, such as the LED, is electrically mounted on the circuit 11A. Therefore, the thickness of the light housing 22A can be substantially reduced by the configuration of the illumination unit 10A. In addition, the portable reading light is  
15           capable of selectively sliding along the seat belt below the shoulder portion of the user so that the user, such as the passenger, is able to self-adjust the position of the portable reading light along the seat belt for his or her preference.

             It is worth to mention that due to the advance in surface mount LED and the flexible circuit board technologies, the illumination unit 10A can be directly mounted on  
20           the seat belt at a position below the shoulder portion of the user without any noticeable obstruction. Accordingly, the electric wire of the illumination unit 10A can be woven into the seat belt to connect with the vehicle battery, such as through the powered seat of the vehicle, so as to permit the retraction operation of the seat belt.

             One skilled in the art will understand that the embodiment of the present  
25           invention as shown in the drawings and described above is exemplary only and not intended to be limiting.

             It will thus be seen that the objects of the present invention have been fully and effectively accomplished. Its embodiments have been shown and described for the purposes of illustrating the functional and structural principles of the present invention  
30           and is subject to change without departure from such principles. Therefore, this invention includes all modifications encompassed within the spirit and scope of the following claims.